

CLAIMS

1. A chemical liquid injection system including: a liquid syringe having a piston member being inserted slidably into a cylinder member filled with a liquid, and a chemical liquid injector having a liquid injection mechanism for relatively moving the cylinder member and the piston member of the liquid syringe exchangeably mounted on the chemical liquid injector to inject the liquid into a patient; wherein

said liquid syringe further comprises an RFID (Radio Frequency Identification) chip having various types of data recorded thereon, the RFID chip being mounted on said liquid syringe, and

said chemical liquid injector further comprises:

an RFID reader for obtaining the various types of data recorded on the RFID chip; and

operation control means for performing a predetermined operation in accordance with at least some of the various types of obtained data.

2. The chemical liquid injection system according to claim 1, wherein said chemical liquid injector further comprises data display means for outputting and displaying various types of data, and

said operation control means comprises data holding means for holding the various types of data obtained from said RFID chip and display control means for causing the data display means to output at least some of the various types of held data.

3. The chemical liquid injection system according to claim 2, wherein

said chemical liquid injector comprises an injection control unit on which at least the operation control means is mounted and an injection head formed separately from the injection control unit, at least the liquid injection mechanism and the data display means being mounted on the injection head.

4. The chemical liquid injection system according to claim 3, wherein said RFID reader is mounted on the injection head.

5. The chemical liquid injection system according to any one of claims 1 to 4, wherein said RFID reader is placed at a position where the RFID reader detects said RFID chip of the mounted liquid syringe in said chemical liquid injector.

6. The chemical liquid injection system according to claim 5, wherein said operation control means controls the liquid injection mechanism to enable its operation only when said RFID reader detects said RFID chip.

7. The chemical liquid injection system according to claim 5 or 6, wherein said operation control means places the liquid injection mechanism at an initial position when the completion of injection operation is detected and then the detection of said RFID chip by said RFID reader is finished.

8. The chemical liquid injection system according to any one of claims 1 to 7, wherein said operation control means comprises data holding means for holding the various types of data obtained from said RFID chip and injection control means for controlling the operation of the liquid injection mechanism in

accordance with at least some of the various types of held data.

9. The chemical liquid injection system according to claim 8, wherein said liquid syringe is of a pre-filled type which is shipped with a contrast medium filled thereinto as the liquid to be injected into a patient whose diagnostic image is taken by a diagnostic imaging apparatus, said RFID chip of the liquid syringe has a variable pattern set thereon for changing an injection rate of the contrast medium with time, and

said operation control means changes the operation rate of the liquid injection mechanism with time in accordance with the variable pattern.

10. The chemical liquid injection system according to any one of claims 1 to 9, wherein said operation control means comprises data storing means for storing predetermined check conditions as data, data collating means for collating the stored check conditions with the various types of data obtained from said RFID chip, and alarm outputting means for outputting a check alarm based on the collation result.

11. The chemical liquid injection system according to any one of claims 1 to 10, wherein said RFID chip has at least a production number of each of said liquid syringes set thereon, and

said operation control means comprises data accumulating means for storing the production number of said liquid syringe which was mounted and used to perform injection operation, data collating means for collating the stored production number with the production number of a newly mounted liquid syringe, and alarm outputting means for outputting a check alarm when

the collated production numbers match.

12. The chemical liquid injection system according to any one of claims 1 to 11, wherein said liquid syringe has said RFID chip mounted thereon, the fact that the liquid syringe is used once or “used” being recorded as data on said RFID chip, and

said operation control means comprises data recording means for recording the “used” on said RFID chip of the liquid syringe which was mounted and used to perform injection operation, and alarm outputting means for outputting a check alarm when the “used” is obtained from said RFID chip of the liquid syringe.

13. The chemical liquid injection system according to any one of claims 1 to 12, further comprising peripheral device for the syringe including a hollow needle-like member inserted into the patient to flow the liquid, an extension tube connecting the needle-like member to said liquid syringe to flow the liquid, and a unidirectional valve inserted into the extension tube to regulate the flow direction of the liquid, and

an RFID chip having various types of data recorded thereon being mounted on each peripheral device for the syringe.

14. The chemical liquid injection system according to any one of claims 1 to 13, further comprising peripheral tool for the patient including a wristband put on an arm of the patient and a medical chart on which various types of data about the patient are written, and

an RFID chip having various types of data about the patient recorded

thereon being mounted on each peripheral tool for the patient.

15. The chemical liquid injection system according to any one of claims 1 to 14, further comprising a liquid warmer for keeping the liquid in the mounted liquid syringe at an appropriate temperature with a heat-retaining mechanism, the liquid warmer being provided separately from said chemical liquid injector,

wherein the liquid warmer comprises:

an RFID reader for obtaining the various types of data recorded on said RFID chip; and

operation control means for performing a predetermined operation in accordance with at least some of the various types of obtained data.

16. A chemical liquid injector in the chemical liquid injection system according to any one of claims 1 to 14, comprising:

an RFID reader for obtaining the various types of data recorded on the RFID chip; and

operation control means for performing a predetermined operation in accordance with at least some of the various types of obtained data.

17. A liquid warmer in the chemical liquid injection system according to claim 15, comprising:

an RFID reader for obtaining the various types of data recorded on the RFID chip; and

operation control means for performing a predetermined operation in accordance with at least some of the various types of obtained data.